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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,231	04/17/2007	Thomas Birkhofer	095309.58110US	6777

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EXAMINER
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ZHU, JOHN X

ART UNIT	PAPER NUMBER
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2831

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/589,231	<b>Applicant(s)</b> BIRKHOFFER ET AL.	
	<b>Examiner</b> JOHN ZHU	<b>Art Unit</b> 2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 29-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 29-56 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/11/06</u> .   | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the temperature sensor and the coil arranged at least partially in the interior of the soot particle filter, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

2. Claim 1 is objected to because of the following informalities: the claim “the partial volume region forms part of the component” is not clear. The partial region cannot be a part of the component but rather be encapsulated or enclosed by the component. For the purpose of examination, this will be the way the claim is read.

Appropriate correction is required.

3. Claim 36 is objected to because of the following informalities: lack of antecedent basis for “the regeneration of the filter”. Appropriate correction is required.

4. Claim 37 is objected to because of the following informalities: lack of antecedent basis for “the measurement signal”. Appropriate correction is required.

***Double Patenting***

5. Applicant is advised that should claim 42 be found allowable, claim 43 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

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6. Applicant is advised that should claim 44 be found allowable, claim 45 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

7. Applicant is advised that should claim 46 be found allowable, claim 47 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

8. Applicant is advised that should claim 48 be found allowable, claim 49 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 29, 30 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton (5,497,099) in view of Gloger et al. (DE 10128869 A1).

With respect to claims 29 and 50, Walton discloses all aspects of the claims including a device for determining the state of a soot particle filter of an internal combustion engine, comprising

an electrical measuring arrangement (Fig. 1) configured as a soot sensor for measuring a soot deposit of the soot particle filter (16),

including an electrical component with a conductor structure (Fig. 3, 4) for exciting an electrical or magnetic field (antenna system) influenceable by the soot deposit and characterizes an electrical or magnetic characteristic variable of the component as a measure of a quantity of the soot deposit,

wherein the conductor structure is arranged such that a partial volume region (Fig. 3, 4) of the soot particle filter is penetrated by the electrical field and the partial volume region forms part of the component.

Walton does not explicitly disclose the electrical component is a capacitor, with a first electrode and a second electrode apart from each other, with the partial volume region between the electrodes.

Gloger discloses a capacitive soot sensor (Fig. 1) with first and second electrodes (electrodes 2) with a volume region in between.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton to include the capacitive soot sensor as taught by Gloger into the soot filter for the purpose of reliable sensors that can reduce power usage.

With respect to claim 30, Walton further discloses the sensors being able to be put near the exhaust inlet or outlet of the filter. See. Figs. 4a-c.

11. Claims 29, 31-34, 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton (5,497,099) in view of Whittington et al. (5,811,664).

With respect to claim 29, Walton discloses all aspects of the claims including a device for determining the state of a soot particle filter of an internal combustion engine, comprising

an electrical measuring arrangement (Fig. 1) configured as a soot sensor for measuring a soot deposit of the soot particle filter (16),

including an electrical component with a conductor structure (Fig. 3, 4) for exciting an electrical or magnetic field (antenna system) influenceable by the soot deposit and characterizes an electrical or magnetic characteristic variable of the component as a measure of a quantity of the soot deposit,

wherein the conductor structure is arranged such that a partial volume region (Fig. 3, 4) of the soot particle filter is penetrated by the electrical field and the partial volume region forms part of the component.

Walton does not explicitly disclose the electrical component is a coil or a capacitor.

Whittington discloses a coil (Fig. 3, 5, element 2) used to enclose a system to detect for particles.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton to include the coil detection system as taught by Whittington for the purpose of increasing sensitivity of the sensing system.

With respect to claims 31-34, Walton does not explicitly disclose measuring a characteristic variable of the component which is linked to the electrical impedance, wherein at least one of the absolute value and phase of the impedance is measurable, and wherein at least one of the ohmic resistance, the capacitance and the inductance of the component is measurable.

Whittington discloses the measurement being linked to the change in inductance of the coil. See claim 16; See also column 1, lines 30-36. Inductance is one component of impedance, more specifically, it is the imaginary party called the reactance of impedance. Thus, with simple mathematical calculations, it is possible to measure the impedance in terms of the imaginary part, which is the inductance.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton to include the measurement as taught by Whittington for the purpose of measuring changes in frequency, and thus inductance of the flow to determine the presence of debris.

With respect to claims 39 and 41, Walton does not explicitly disclose a coil-shaped conductor structure is arranged on the outside of the soot particle filter, or that the conductor structure is oriented parallel to a longitudinal axis of the filter. Walton's filter is of cylindrical configuration (Figs. 3 and 4).

Whittington discloses a coil shaped conductor arranged on the outside of a device under detection that is oriented parallel to a longitudinal axis. See. Fig. 3.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton to include the coil orientated on the outside of the device under detection for the purpose of non-obstructive detection of undesired particles.

With respect to claims 38 and 40, Walton does not explicitly disclose a coil-shaped conductor structure is arranged at least partially in the interior of the soot particle filter, or that the conductor structure is oriented parallel to a longitudinal axis of the filter. Walton's filter is of cylindrical configuration (Figs. 3 and 4). This is similar to claims 39 and 41 as above except for the at least interior aspect.

Whittington discloses a coil shaped conductor arranged on the outside of a device under detection that is oriented parallel to a longitudinal axis. See. Fig. 3. However, rearrangement of parts is not patentably distinct unless new or unexpected results are produced. See *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton to include the coil as taught by Whittington for the purpose of inductively detecting debris, and further obvious to include the coil on at least partially on the inside of the filter for the purpose of reducing vibrations that may cause errors.

12. Claims 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton (5,497,099) in view of Gloger et al. (DE 10128869 A1) as applied to claim 29 above, and further in view of Pattas (5,067,973).

With respect to claims 35 and 36, Walton as modified does not explicitly disclose automatically starting regeneration of the filter when a measured value is reached.

Pattas discloses automatically starting regeneration of the filter when a measured value is reached (column 2, lines 64-66).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton and Gloger to include the automatic regeneration as taught by Pattas for the purpose of providing better filter performance and subsequently, engine performance.

With respect to claim 37, Walton as modified does not explicitly disclose means are provided for measuring the temperature of the filter.

Pattas discloses temperature sensors (Fig. 1, elements 8 and 9) for measuring the temperature of the filter.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton and Gloger to include the temperature measuring sensors as taught by Pattas for the purpose of measuring temperature and determining the time for regeneration.

13. Claim 42-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton (5,497,099) in view of Whittington et al. (5,811,664) as applied to claim 38 above, and further in view of Kellett et al. (5,001,424).

With respect to claim 42-49, Walton discloses the filter system being an exhaust gas flow system (Column 1, lines 10-11). Walton as modified does not explicitly disclose the measuring arrangement further comprises a second conductor structure, the coil-shaped conductor structure being operatively connected to the second conductor structure which has an electrical characteristic variable influenceable by the soot deposit and measurable by the measuring means, wherein a variable that correlates to the mutual inductance is measurable, and wherein the conductors are offset with respect to each other in the exhaust system.

Orpet discloses a particle detection system with two conductor structures (Figs. 1-3) offset to each other for the purpose of measuring the mutual inductance of the coils (abstract).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton and Whittington to include the two conductor structure as taught by Orpet for the purpose of detecting particles using the mutual inductance method to improve accuracy.

14. Claims 51-55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton (5,497,099) in view of Gloger et al. (DE 10128869 A1) as applied to claims 50 and 29 respectively, and further in view of Too (JP 62076441 A).

With respect to claim 51-56, Walton discloses the filter system being an exhaust gas flow system (Column 1, lines 10-11). Walton as modified does not explicitly disclose at least the first electrode and the second electrode is arranged on or a short distance from an outer surface of the soot particle filter, or that the measuring arrangement further comprises two pairs of electrodes arranged offset.

Too discloses a capacitive sensor detecting the flow state of particles in a pipe having the electrodes on the outer surface of the pipe (Fig. 2, element 5), with two pairs of electrodes (elements 5 and 6) offset from the direction of the flow.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Walton, Gloger to include the arrangement for Too for the purpose of non-disruptive testing that does not affect the flow of the particles

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inside the device under test (abstract). And further obvious to include two pairs of electrodes offset from each other to determine the speed of the flow in the filter system.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Orpet et al. (GB 2101330 A) disclose a particle detection system with two coils and measuring the balance between those two coils.

Kempster et al. (5,444,367) discloses a particle detection system with coils.

Haase (4,710,757) discloses a capacitance particle detection system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN ZHU whose telephone number is (571)272-5920. The examiner can normally be reached on M-F, 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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